



EVALUATION OF THE 2003 MODEL BUILDING CODES

PRELIMINARY REPORT

JUNE 11, 2003

DSA will consider comments received from the model code organizations, other state agencies, and the public during the June 26, 2003 Coordinating Council meeting in the development of our final report. The final report will be presented at the July 2, 2003 meeting of the Code Change Committee of the Building Standards Commission.

THE DIVISION OF THE STATE ARCHITECT

The Division of the State Architect (DSA) is the adopting and enforcement agency for Title 24, with application to public school and state essential services building (ESB) facilities.

DSA has the authority and responsibility to amend the adopted model building code as necessary to meet the requirements and performance objectives of the Field Act (Education Code Sections 17280 – 17317), for application to public schools. DSA enforces the fire & panic provisions of Title 24, as promulgated by the State Fire Marshal.

DSA also has the authority and responsibility to amend the adopted model building code as necessary to meet the requirements and performance objectives of the Essential Services Facilities Act (Health & Safety Code Sections 16000-16023), for application to state-owned or state-leased ESBs.

DSA also promulgates administrative code provisions pertaining to enforcement of building standards within Part 1, Title 24, and does not adopt the administrative provisions of the adopted model building code pertaining to code enforcement.

OVERVIEW OF THE EVALUATION PROCESS

DSA is evaluating the *2003 International Building Code* and the *2003 NFPA 5000 Building Construction and Safety Code* for adoption as the 2004 California Building Code (CBC).

The scope of model code provisions within this evaluation includes all structural and non-structural aspects of design and construction that DSA currently regulates for public schools and state ESBs (e.g. 2001 CBC provisions currently adopted by DSA). This evaluation does not consider fire & panic provisions contained the model building codes that are typically adopted by the State Fire Marshal (and enforced by DSA).

Comparative Analysis

A comparative analysis with the 2001 CBC has been conducted for each model code. For each 2001 CBC section or table, DSA has reviewed the model code to identify:

- 2003 model code provisions that correspond to CBC provisions (i.e. regulate in whole or in part, the aspects for building design or construction regulated by the CBC provision). Assessment of substantial differences between 2003 model code and 2001 CBC provisions may be required prior to adoption of the 2003 provision.
- 2001 CBC provisions for which there are no corresponding provisions in the 2003 model code. Continuation of the 2001 CBC provisions may be necessary to maintain efficient and consistent enforcement activities.

Additionally, DSA has identified 2003 model code provisions for which there are no corresponding 2001 CBC provisions (e.g. newly regulated aspects of design or construction). These must be assessed prior to adoption.

Amendment Workload

The comparative analysis was used to identify amendment workload, which may include assessment of model code provisions to be considered for adoption, continuation of current amendments, and development of new amendments.

DSA has determined any significant differences in the scope of work required to implement either model code as the 2004 CBC for application to public schools and state ESBs, which is the basis for DSA's recommendation for the model code to be proposed for adoption as the 2004 CBC.

The following criteria must be met for the 2004 CBC, and have been used to determine the scope of work to amend either model building code:

- Code provisions (including any referenced standards) are written in concise, enforceable regulatory language, to best fulfill the code's primary purpose, which is use by DSA as an enforcement agency to protect public safety and welfare.
- Code adopts or is based on current recognized standards. The code development process must provide for review and amendment as necessary of standards to address any conflicts between referenced standards and code provisions or other referenced standards, to meet code objectives, and to address specific statewide concerns (e.g. seismicity).
- Provisions of the CBC (including any referenced standards) meet statutory and regulatory mandates and performance objectives for public school and state essential services facilities.
- 2004 CBC continues current prescriptive code provisions for design and construction deemed essential for consistency and efficiency in code enforcement. DSA workload is currently at a historically high level, and our agency objective that 2004 CBC enforcement activities (plan review and construction inspection) not exceed

current (2001 CBC) timeframes for public school and state ESB projects must be met.

EVALUATION PROCESS ENDORSEMENT

At the April 23, 2003 public meeting of the DSA Advisory Board, presentations were given by ICC and NFPA of their respective codes and code organizations. DSA staff presented DSA's code evaluation criteria and process as developed to date, and solicited input from the Board, ICC, NFPA and the public regarding the evaluation process and criteria.

At the May 28, 2003 public meeting of the DSA Advisory Board, a presentation of DSA's code evaluation process and findings to date were made. The Advisory Board formally endorsed by unanimous vote, the model building code evaluation process that DSA has employed.

BASIS OF THE EVALUATION

DSA used information from the following means to conduct the evaluation:

- Comparative analysis of the NFPA5000 and IBC (and referenced standards/publications) with the 2001 CBC.
- ICC and NFPA presentations to the state agencies and BSC provided in January 2003.
- Review of comparative studies by various professional organizations and governmental entities.
- Evaluation criteria recommended by various professional organizations.
- Specific questions directed to ICC and NFPA pertaining to their code, code development, and code support programs.

LIMITATIONS OF THE EVALUATION

The scope of this evaluation is limited to the aspects of the model code that pertain to DSA's code adoption and enforcement programs for public schools and state essential services buildings.

DSA has not evaluated the model fire codes. DSA understands that the Uniform Mechanical Code, Uniform Plumbing Code, and National Electrical Code will remain the model codes used in California.

SUMMARY OF FINDINGS

The evaluation considered 2001 CBC chapters 14A, 15, 16A, 17A, 18A, 19A, 20A, 21A, 22A, 23A, 24, 25A, 31, 33, and 35 (CBC chapters adopted by DSA).

Chapter 23A – WOOD

The wood design and construction provisions are of particular importance to DSA, as approximately 75-80% of the projects we review contain wood frame construction.

IBC

Chapter 23 maintains the current scope of design and construction provisions, with a more concise format and adoption by reference of the current wood design standard (NDS, 2001 edition, and NDS Supplement).

NFPA5000

Chapter 45 presents two primary concerns that must be addressed by very substantial amendment workload.

1. Design Standards

Sec. 45.4.1 adopts the AF&PA *Allowable Stress Design Manual for Engineered Wood Construction*. This manual is a multi-part package (as stated by the AF&PA), and includes the following separate documents:

- NDS, 2001 edition, and NDS Supplement
- ASD Manual Supplements (lumber, glue-lam, poles, panels, shear walls)
- Supplement: Special Design Provisions for Wind and Seismic
- Guidelines (I-joists, composites, trusses, metal connectors)

The ASD Manual preface states that the manual is directed to design professionals as a design guide. The ASD Manual, ASD Manual Supplements, and Guidelines are not written in enforceable language, and contain much information unrelated the purpose of a building code. The *Supplement: Special Design Provisions for Wind and Seismic* appears to be written in enforceable language, but lack appropriate references to the primary document. There are duplicative provisions contained in the ASD Manual Supplements and the *Supplement: Special Design Provisions for Wind and Seismic*.

The use of the ASD Manual (or the LRFD Manual referenced in Sec. 45.4.2) and supporting documents are not suitable for use by DSA. Our workload plan is to amend Sec. 45.4.1 to reference the NDS, 2001 edition, and NDS Supplement (which are enforceable standards), and to incorporate the necessary design and construction provisions from the Supplements into the body of the code by amendment.

2. Conventional Construction Provisions

NFPA5000 does not contain provisions for conventional construction, and references (Sec. 45.4.1.3) the *Wood Frame Construction Manual* (WFCM) for application to one and two-family dwellings. The WFCM is a design standard that contains both engineered (Sec. 2) and prescriptive (Sec. 3) design provisions, and design tables, illustrations, and conventional construction provisions within each Section.

The current CBC provisions for conventional construction are applicable to wood-frame construction regardless of occupancy, and DSA adopts and amends these provisions for application to schools. For two reasons, DSA will not attempt to use the WFCM provisions. First, DSA will not expand the scope of the standard beyond its stated scope, and second, the use of the WFCM would be very inefficient to fulfill DSA's needs. DSA's workload plan is to continue the conventional provisions currently contained in the 2001 CBC, which include model code and state amendment provisions.

Other CBC Chapters

DSA's review of chapters 20 (Lightweight Metals), 22 (Steel), 24 (Glass and Glazing), 25A (Gypsum Board and Plaster), and 31 (Special Construction) indicated no material differences between the IBC and NFPA5000 provisions.

DSA's review of chapters 16A (Structural Forces), 18A (Foundation and Retaining Walls), 19A (Concrete), 21A (Masonry) indicated the following:

The prescriptive design and construction provisions contained in the IBC materials chapters (e.g. 1905A, 1906A, 2104A) provide substantial usability improvement over the use of referenced standards (NFPA5000), particularly with field enforcement staff.

The design provisions and amendments to referenced standards (e.g. ASCE7-02 per IBC Sections 2106, 2107, 2108) provide substantial benefit to DSA's program, and are endorsed by the Structural Engineer's Association of California (correspondence to the State Architect, dated June 6, 2003).

Model Code Organization Support Programs

The primary support programs utilized by DSA include:

- Interpretations (verbal, written, published)
- Product evaluation and acceptance (for products and assemblies not fully regulated by the code)

DSA posed written questions to each model code organization regarding support programs, and received written responses from both organizations. The ICC interpretation and product evaluation programs are essentially a continuation of the ICBO programs which DSA has used extensively.

NFPA indicated that they are issuing the first edition handbook for *NFPA5000* later this year, and will expand their current interpretation program (for the NEC and other NFPA codes and standards) to provide the same level of service for the NFPA5000. NFPA also indicated that they have established a product evaluation service, which will be available by the end of 2003.

Regarding the model code organization support programs, the established interpretation and product evaluation programs of the ICC are, at this time, preferable to the programs of the NFPA, due to the many years of continual development of these programs, and DSA's familiarity with these programs.

CONCLUSIONS AND RECOMMENDATION

The NFPA5000 poses substantially greater workload than the IBC in order to be adopted as the 2004 CBC, due primarily to the identified problems with Chapter 45 (Wood), and necessary continuation of prescriptive design and construction provisions for veneer, roofing, foundations, concrete, and masonry.

We have not yet determined the workload to amend the NFPA5000, due to the complexities with developing comprehensive new amendments for the NFPA5000 to replace model code (amended) provisions contained in the 2001 CBC.

The IBC remains similar in format and content to the 2001 CBC. We believe that the amendment workload associated with the IBC can be completed by our current staff within the timeframe that the Building Standards Commission has tentatively scheduled (July 1, 2004).

DSA believes that the IBC best meets the criteria for the 2004 CBC (see page 2), and is recommended as the model building code for adoption as the 2004 CBC.

DIVISION OF THE STATE ARCHITECT ADVISORY BOARD ENDORSEMENT

At the June 10, 2003 meeting of the DSA Advisory Board Meeting, a presentation of findings and DSA's recommendation for the model building code were made. The Board, by unanimous vote, endorsed the DSA recommendation that the 2003 International Building Code be adopted as the 2004 California Building Code.